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4. Those, who as clergymen, physicians or legal advisers, have to attend the sick-beds of sufferers from infectious disorders, may, on occasion, avail themselves of the protection afforded by Dr. Stenhouse's instrument during their intercourse with the sick.

5. The longing for a short and decisive war has led to the invention of "a suffocating bomb-shell," which on bursting, spreads far and wide an irrespirable or poisonous vapor; one of the liquids proposed for the shell is the strongest ammonia, and against this it is believed that the charcoal respirator may defend our soldiers. As likely to serve this end, it is at present before the Board of Ordnance.

Dr. Wilson stated, in conclusion, that Dr. Stenhouse had no interest but a scientific one in the success of the respirators. He had declined to patent them, and desired only to apply his remarkable discoveries to the abatement of disease and death. Charcoal had long been used in filters to render poisonous water wholesome; it was now to be employed to filter poisonous air.

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DUTY FREE SUPPLIES

THE interest in duty-free material has changed to some extent since 1914 because of the impossibility since that time of importing materials from the Central Powers, the former source of supply. During the war some American firms have turned elsewhere, because our European Allies were not in a position to meet the demand.

When the duty-free law was passed, provision was made for the importation without tariff of materials for educational institutions and those engaged in scientific research. The purpose of this law, of course, was to give these institutions the advantage of anything that was made in foreign countries and thus American scientists and the country as a whole were enabled to receive the benefit of foreign endeavor as far as possible. This was a means of promoting knowledge and in the early days of scientific production was certainly of great benefit to this country, but it also had ill effects as by-products. Scientific materials were used in large quantities and though there was demand enough, it was difficult for a business to succeed in this country where labor is paid at a higher schedule than abroad. Consequently, many lines of supplies which were used in considerable quantities were almost exclusively imported from foreign countries. Of course, it is true that these supplies, from a financial standpoint, were of very little importance as far as the country at large is concerned, because the values concerned amount to only a few million dollars annually.

But it must be recognized that we learn to make things by actual experience, and if one produces scientific apparatus and produces it in an efficient and satisfactory manner, he is able consequently to produce a related thing for which there might be a critical need. For instance: when the war broke out and the importations from the Central Powers ceased, this country found itself almost entirely without optical glass. The optical glass used in scientific institutions had been imported and everything went along quite normally in peace times but with the outbreak of the war optical glass became a vital necessity, for one might say there is no instrument of defense which is not connected in some way with optical glass, ranging all the way from telescopes and field-glasses to eyeglasses. The country that can not produce such things satisfactorily and cheaply in an emergency is certainly greatly handicapped in providing defense. We all know of the consternation caused in this country in April, 1917, as the seriousness of the situation dawned upon the government and the public, when it was discovered that no optical glass, broadly speaking, was available for war work, the supply of foreign glass having been exhausted. Perhaps in a minor way this same state of affairs occurred in almost every other industry of scientific nature in this country. One need only consider the difficulty in securing such instruments as polariscopes and microscopes to realize the scarcity that is bound to exist where any one country is dependent upon another for absolutely necessary supplies.

Therefore it is certainly true that the na-

tional welfare requires that the manufacturer of scientific apparatus in this country should be sufficiently protected so as to be enabled to compete with foreign production. But, on the other hand, it is evident that if we make the duty on such supplies so rigid as to exclude foreign articles entirely, a decided handicap on knowledge must result, for it is well understood by those who have been in touch with scientific production that certain things, such as fine instruments and rare chemicals, can only be profitably made by one concern, perhaps, in the whole world. It does not pay any one else to compete with such a manufacturer as the sales are too small. If, for instance, there is need of some rare organic chemical that is only made by one man in the world and, while of very great scientific value, is not sufficiently used to warrant any two concerns to study the details of manufacture, it is obviously unwise to handicap any scientist in any country from obtaining this article. Many of the chemicals in Kahlbaum's list, so familiar to all in pre-war days, come in this category, and it can not be disputed that a prohibitive duty on such items will restrict research work to a considerable extent and serve no good purpose, because the amount of revenue received by the government is too small. In addition, the encouragement given to manufacturers to produce rare chemicals is almost nil and no American firm could be induced to undertake the task. Perhaps in the past the duty-free privilege to institutions was abused, not directly by the institutions, but because of the wording of the original law, for some articles which had acquired a commercial rather than a scientific standing could be imported duty-free by all institutions regardless of the fact whether the article was also produced in this country or not. The patriotic element played no part in the decision, even though the home-made article cost but little more than the imported one.

One great drawback to the importation of scientific apparatus has always been the great amount of time which elapses between placing the order and its delivery. In order to overcome this drawback many people, and this ingeniously, have sought to induce the importer to deliver the goods from the shelves and replace the article when the import shipment arrives. However, this was a distinct evasion of the law and it has been reported that certain firms have been threatened with fines for committing this evasion of the government regulations. In some cases these firms did this unknowingly for the accommodation of the institution. Again, in many cases the interest in the research had almost vanished before the article was delivered. Therefore, to meet the demand, firms that imported materials were compelled to carry immense stocks of imported articles in order that they might have on hand the kind of apparatus or the chemical required. This necessitated an enormous increase in the cost of apparatus to institutions. Furthermore, any improvements to apparatus which might occur to the scientist after having placed the order were impossible of execution, owing to the distance between the manufacturer and the user. It might be said that the distance between manufacturer and consumer has almost always prevented the habit of suggesting improvements from making itself felt. This difficulty could be avoided by having the apparatus manufactured nearer at hand.

The law proposed by the Council of the American Chemical Society, namely, that the duty-free law be entirely abolished, will undoubtedly prove satisfactory to a limited extent.[1] Apparently there is no great opposition to the law on the part of institutions that have been accustomed to duty-free importation and naturally no commercial firm that has made use of duty-paid materials before will oppose it.

As a matter of fact, many American firms make materials that are equal if not superior in many ways to the imported goods. Coors porcelain, made by the Herold Glass & Porcelain Company of Golden, Colorado, Pyrex Glass of the Corning Glass Company of Corn-

[1] See *Journal of the American Chemical Society*, January, 1919, Council Proceedings and *Journal of Industrial and Engineering Chemistry*, January, 1919.

ing, New York, the Nonsol Glass manufactured by Whitall, Tatum & Company at Milville, New Jersey, the especially fine physical control of the Kimble Glass Company at Vineland, New Jersey, and the production of fine special apparatus by Eimer & Amend of New York City—all show what can be done in this country in an emergency. If these conditions continue to be fostered we may in time lead the world in the production of scientific things. Certainly interest in this subject is growing and a movement is now on foot to interest manufacturers, jobbers and buyers in the possible publication of a journal devoted to chemical apparatus.

Undoubtedly the time will come, however, when some qualifying clause should be embodied in the tariff laws by which the defects of the proposed high protective tariff laws will be overcome, in order to assist especially qualified men to procure from abroad articles of great scientific merit though of little commercial value, which of necessity must be produced by the genius who devised the apparatus or prepared the compound. Probably this clause would necessarily be administered by some committee of scientists appointed by the government. Whether these defects to the proposed law are to be remedied by allowing certain things to come in duty-free as indicated, or by a system of bonuses to scientific institutions or members using material, is a debatable question.

To sum up the whole matter, it would seem to the authors that a method should be devised whereby all essential scientific material should be manufactured by the nation and while a general protective duty will probably be secured from Congress, it is our opinion that care should be taken that no obstacle be put in the way of the scientist doing constructive research.

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SCIENTIFIC EVENTS

THE USE OF REINFORCED CONCRETE IN SHIPBUILDING

REINFORCED concrete was first used in making a boat in France in 1849, but its use languished from 1849 until 1887 when a small concrete boat was built in Holland. This boat was first used by duck shooters on account of its high stability, and in 1918 it was still in use by a cement-products company in Amsterdam. Italy, Germany and England next fell in line, and a revival of concrete boat construction in France took place in 1916. Concrete boats were constructed also in New South Wales, Canada, China and Spain. After the outbreak of the war, as her ships were destroyed by submarines, Norway lost no time in building concrete ships. At the Fougner plant, at Moss, the Nannsiffiord, a 200-ton concrete cargo vessel was built and, after a successful trial trip, engaged in traffic between Norway and England and along the Norwegian coast. This was practically the pioneer seagoing self-propelled concrete ship.

In 1918 the construction of two fleets of concrete barges, each barge measuring 20 by 130 feet and of 550 tons capacity, was begun at New Orleans, La., and at Seattle, Wash. In 1918 the *Faith,* a concrete self-propelled merchant vessel of 5,000 tons dead-weight capacity, was launched at San Francisco, Cal.

In the stress to supply new ships reinforced concrete was adopted as a building material mainly for the following reasons: First, the concrete materials required are easily obtained, and the steel needed is employed in a form and quantity which make no strain on the rolling mills; second, the labor is less skilled and is recruited from a class totally different from the ordinary shipyard labor, so that the work does not increase the stress on the existing shipyards; third, a concrete ship costs no more than a steel ship and requires less expenditure for its upkeep; fourth, the time of construction is shorter.

When these facts are coupled with three considerations which make reinforced concrete most valuable for shipbuilding there seem to